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Vol. 41 No. 12

BULLETIN

OF THE

TORREY BOTANICAL CLUB

DECEMBER, 1914

Report on the Hepaticae of Alaska*

ALEXANDER W. EVANS

(WITH PLATE 21 AND THREE TEXT FIGURES)

INTRODUCTION

Through the kindness of Professor T. C. Frye, of the University of Washington, the writer has recently received a large collection of Alaska Hepaticae for determination. It was made in 1913 under the auspices of the Kelp Investigation Expedition of the United States Bureau of Soils. The vast majority of the specimens were collected by Professor Frye himself, but his collection is supplemented by a few specimens collected by Mr. A. B. Foster, Dr. G. B. Rigg, and Dr. R. B. Wylie. The specimens were all gathered near the coast, the easternmost locality being Verdure Creek, near the upper end of Portland Canal, and the westernmost, Mitrofania Bay on the Alaska Peninsula. In spite of the fact that the region visited represents a relatively small portion of Alaska, the collection is the most comprehensive which has yet been brought back from the territory. It includes seventy species in condition to be identified, twenty being new to Alaska (or not before reported), seven new to America, and three new to science. The next largest collection, that of the Harriman Alaska Expedition, contained sixty-three species, thirty-nine of which were reported from Alaska for the first time. Of these thirty-nine species six were new to America and one, *Scapania cordifolia* K. Müll., was new to science, although it was at first confused with another species.

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* Contribution from the Osborn Botanical Laboratory.

[The BULLETIN for November (41: 533–576) was issued 28 N 1914.]

The present report is based on Professor Frye's collection, but it reviews also what is known from other sources about the Hepaticae of Alaska and compares the species found in the territory with those occurring in other parts of the world. In addition to the seventy species represented in the present material, forty other species have been reported from Alaska. Five of these reports, however, were based on incorrect determinations or insufficient evidence, so that only thirty-five of the species can actually be accredited. The total number of species now known from Alaska is, therefore, 105. This number will probably be more than doubled when the flora has been more thoroughly explored.

BIBLIOGRAPHY

In the writer's report on the Hepaticae of the Harriman Expedition the literature of the Alaskan species is reviewed up to the close of 1900. Since that time a small collection of species has been reported upon by the writer, and another small collection by Howe, while a few additional species have been recorded by K. Müller and Stephani. The more important papers dealing with Alaskan species or containing scattered references to them are the following, only those which give actual new records being included:

1. **Cooley, Grace E.** Plants collected in Alaska and Nanaimo, B. C., July and August, 1891. Bull. Torrey Club **19**: 239–249. 1892.

A list of thirteen Hepaticae from Alaska is given on pages 246 and 247, six of the species being reported for the first time.

2. **Coville, F. V.** Botany of Yakutat Bay, Alaska. II.—Botanical report. Contr. U. S. Nat. Herb. **3**: 334–353. 1896.

A list of eight Hepaticae is given on page 351, two being reported for the first time.

3. **Evans, A. W.** Papers from the Harriman Alaska Expedition. V. Notes on the Hepaticae collected in Alaska. Proc. Wash. Acad. Sci. **2**: 287–314. *pl. 16–18.* 1900.

Sixty-three species are listed, including thirty-nine additions to the Alaska flora; two other additions are mentioned incidentally.

4. **Evans, A. W.** Hepaticae collected by William A. Setchell in northern Alaska. Zoe **5**: 129–132. 1901.

Twenty-three species are listed, two for the first time.

5. **Gottsche, C. M., Lindenberg, J. B. G.,** and **Nees von Esenbeck, C. G.** Synopsis Hepaticarum. Hamburg. 1844–47.

Four species are reported from Alaska, all for the first time.

6. **Howe, M. A.** The North American species of *Porella*. Bull. Torrey Club **24**: 512–527. 1897.

Two species are noted from Alaska, one for the first time.

7. **Howe, M. A.** The Hepaticae and Anthocerotes of California. Mem. Torrey Club **7**: 1–208. *pl. 88–122.* 1899.

Several species are reported from Alaska, three for the first time.

8. **Howe, M. A.** Contributions to the botany of the Yukon territory. I. An enumeration of the Hepaticae collected by R. S. Williams, 1898–1899. Bull. N. Y. Bot. Gard. **2**: 101–105. *pl. 14.* 1901.

Several of the species listed, including two additions, came from Alaska. One of the species, *Scapania imbricata*, is described as new and figured.

9. **Merriam, C. H.** Plants of the Pribilof Islands, Bering Sea. Proc. Biol. Soc. Wash. **7**: 133–150. 1892.

A list of three Hepaticae is given on page 150, the records being new but containing no additions to the Alaska flora.

10. **Müller, K.** Neue und kritische Lebermoose. Bull. Herb. Boissier II. **3**: 34–44. *pl. 1.* 1903.

A new species, *S. cordifolia*, is described from Alaska specimens.

11. **Müller, K.** Monographie der Lebermoosgattung *Scapania* Dum. Nova Acta Kaiserl. Leop.-Carol. Acad. **88**: 1–312. *pl. 1–52.* 1905.

Several species are quoted from Alaska, a few of the records being new, although no additions to the Alaska flora are reported.

12. **Pearson, W. H.** List of Canadian Hepaticae. 1–31. *pl. 1–12.* Montreal. 1890.

Several species are quoted from Alaska, one record being new.

13. **Rothrock, J. T.** Sketch of the flora of Alaska. Rept. Smithsonian Institution for 1867: 433–463. 1867.

A list of six Hepaticae, all representing additions to the flora of Alaska, is given on page 462.

14. **Stephani, F.** Hepaticae von der Halbinsel Alaska, gesammelt 1881/1882 von den Doctoren Arthur und Aurel Krause. Bot. Jahrb. **8**: 96–99. *pl. 3, f. 9–11.* 1887.

Twenty-two species are listed, sixteen for the first time. Of these sixteen species four are described as new, viz., *Scapania albescens*, *Radula arctica*, *R. Krausei*, and *Frullania chilcootiensis*. The *Scapania*, however, is synonymous with *S. Bolanderi*, while *R. arctica* is probably synonymous with *R. Bolanderi* and *R. Krausei* with *R. complanata*.

15. **Stephani, F.** Species Hepaticarum. Bull., Mém., and Compl. au Bull. Herb. Boissier. 5 vols., the fifth in course of publication. 1898–1914.

Several species are recorded from Alaska, three for the first time.

16. **Underwood, L. M.** A preliminary list of Pacific Coast Hepaticae. Zoe 1: 361–367.

Among the species quoted from Alaska two represent additions to the flora.

LOCALITIES VISITED BY THE KELP EXPEDITION

The portion of Alaska investigated by the Kelp Expedition falls almost entirely within the Pacific Coast Forest region, as defined by the United States Forest Bureau. One or two of the westernmost stations, where arctic conditions prevail, offer the only exceptions to this statement. All of the localities visited are on or near the coast and are characterized by a heavy rainfall and low temperatures, although extremes of cold are rarely encountered. These conditions are unusually favorable for the growth of Hepaticae, and it is not surprising that they form a significant element of the flora.

With five exceptions the localities where the Hepaticae were collected are situated in the southeastern part of Alaska, a district containing numerous islands separated from one another and from the mainland by narrow channels. Forests abound everywhere, the prevailing tree being the western hemlock, *Tsuga heterophylla* (Raf.) Sarg. Another conspicuous tree is the Sitka spruce, *Picea sitchensis* (Bong.) Carr., while the Alaska cypress, *Chamaecyparis nootkatensis* (Lamb.) Spach, and the mountain hemlock, *Tsuga Mertensiana* (Bong.) Carr., are of frequent occurrence. Among deciduous trees the red alder, *Alnus rubra* Bong., is perhaps the most abundant. The five stations which are not in the southeastern part of Alaska represent a portion of the territory where the western hemlock, the Sitka spruce, and the mountain hemlock reach the northern and western limits of their ranges and gradually disappear. The balm-of-Gilead, *Populus balsamifera* L., is a deciduous species occurring in the same region.

The accompanying map (TEXT FIG. 1), after a sketch by Professor Frye, will show how most of the localities where specimens were collected are situated, and the following data, likewise supplied by Professor Frye, will give further information about the localities. The numbers correspond with those on the map.

1. AATS BAY. North shore of Coronation Island. The collections were made about the south end of the west arm and on the

peak to the southward. About latitude 55° 53′ and longitude 134° 15′.

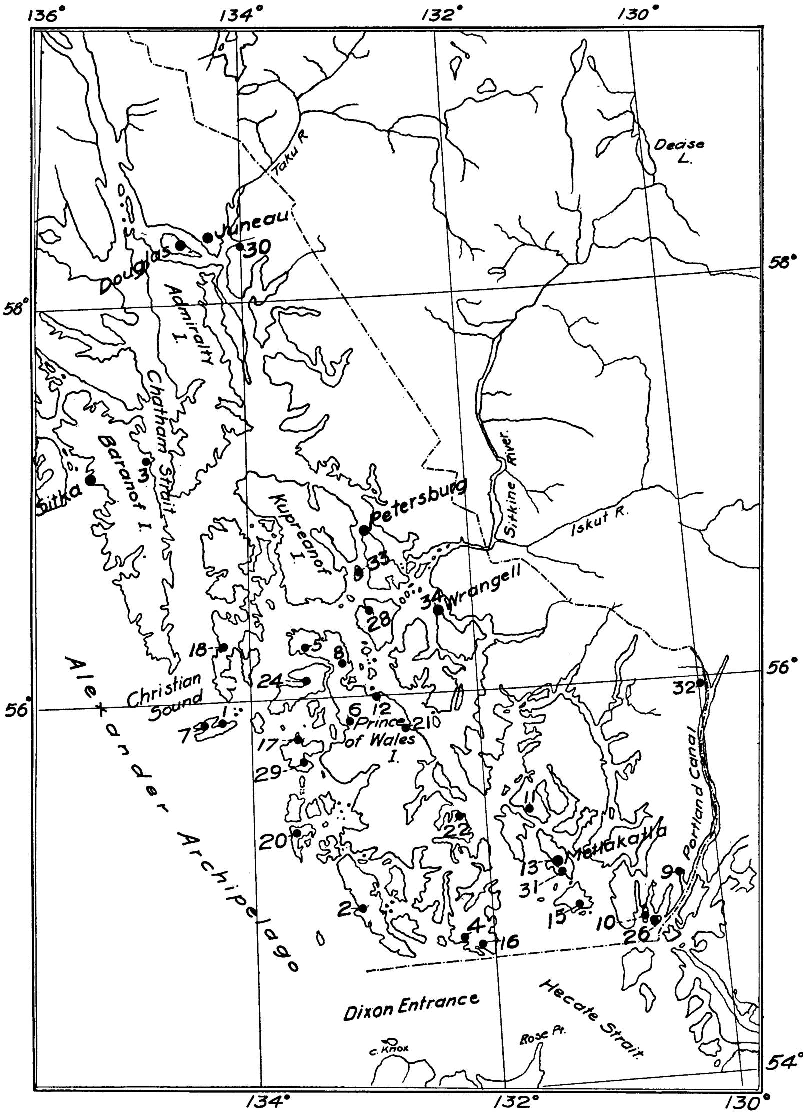

FIG. 1. Map of southeastern Alaska, showing most of the localities visited by the Kelp Expedition. Drawn by Mr. S. J. Berard, after a sketch by Professor T. C. Frye.

2. AUGUSTINE BAY. West shore of Dall Island, just north of Cape Augustine. The collections were made within a half mile of the head of the Bay. About latitude 54° 58′ and longitude 133° 11′.

3. BARANOF. Post office and warm springs on Warm Spring Bay, east shore of Baranof Island. The collections were all made within 300 yards of the warm springs. About latitude 57° 5′ and longitude 134° 50′.

4. BROWNSON BAY. South shore of Prince of Wales Island. The collections were made on a trip from the head of the Bay westward to the head of a large lake about a mile and a half distant, then down the east side of the lake to its outlet and diagonally back to the head of the Bay. About latitude 54° 46′ and longitude 132° 15′.

5. CALDER. Post office and quarry on Shakau Bay, Prince of Wales Island. The collections were made within quarter of a mile of the quarry. About latitude 56° 10′ and longitude 133° 27′.

6. DEWEYVILLE. Indian village on Prince of Wales Island at Sarkar Cove, an indentation opening on El Capitan Passage. The collections were made at the head of the Cove within quarter of a mile of the village. About latitude 55° 57′ and longitude 133° 14′.

7. EGG HARBOR. North shore of Coronation Island. The collections were made near the south end of the Harbor and along a stream to the westward for about a mile. About latitude 55° 54′ and longitude 134° 19′.

8. EXCHANGE COVE. Shore of Prince of Wales Island, southeast of Zarembo Island. The collections were made on the north shore of a stream flowing into the Cove. About latitude 56° 12′ and longitude 133° 5′.

9. HIDDEN INLET. An arm of Pearse Inlet near the mouth of Portland Canal. The collections were made at the mouth of the Inlet, on the west shore. About latitude 54° 56′ and longitude 130° 20′.

10. KANAGUNUT ISLAND. Very near the southeast corner of Alaska. The collections were made along the east shore and about a quarter of a mile from the north end. About latitude 54° 5′ and longitude 130° 43′.

11. KETCHIKAN. Town on Tongass Narrows. The collec-

tions were made chiefly along a creek. About latitude 55° 21′ and longitude 131° 38′.

12. LAKE BAY. Northeast shore of Prince of Wales Island, south of Zarembo Island. The collections were made near the shore and about quarter of a mile north of the cannery. About latitude 56° 1′ and longitude 132° 55′.

13. METLAKATLA. Town on the west shore of Annette Island. The collections were made near the shore eastward and along a stream with a waterfall, the outlet of a lake about two miles from the town. About latitude 55° 7′ and longitude 131° 33′.

14. MITROFANIA BAY. Southeast shore of Alaska Penninsula, northeast of the Shumagin Islands. About latitude 56° 0′ and longitude 158° 45′. Not shown on the map.

15. MORSE COVE. South shore of Duke Island. The collections were made along the shore of the Cove and about two miles to the southwestward. About latitude 54° 55′ and longitude 131° 16′.

16. NICHOLS BAY. South shore of Prince of Wales Island, near Cape Chacan. The collections were made on and near the west side of the Bay, About latitude 54° 43′ and longitude 132° 8′.

17. PORT ALICE. North shore of Heceta Island. The collections were made along the west shore of an inlet and near the head. About latitude 55° 48′ and longitude 133° 35′.

18. PORT MALMSBURY. West shore of Kuiu Island. The collections were made along the west shore and near the head of the second arm to the southward. About latitude 56° 12′ and longitude 134° 9′.

19. PORT CHATHAM. Near the western end of Kenai Peninsula at the mouth of Cook Inlet. The collections were made along the north shore. About latitude 59° 14′ and longitude 151° 45′. Not shown on the map.

20. PORT SAN ANTONIO. East shore of Baker Island. About latitude 55° 22′ and longitude 133° 37′.

21. RATZ HARBOR. East shore of Prince of Wales Island, opposite Etolin Island. The collections were made near the south arm of the Harbor, close to the mouth of the salt water lagoon. About latitude 55° 53′ and longitude 132° 35′.

22. SALTERY COVE. An indentation of Kasaan Bay, on the

east shore of Prince of Wales Island. The collections were made at the head of the Cove, within quarter of a mile of the cannery. About latitude 55° 24′ and longitude 132° 19′.

23. SEWARD. South shore of Kenai Peninsula. About latitude 60° 8′ and longitude 147° 45′. Not shown on the map.

24. SHIPLEY BAY. Northwest shore of Prince of Wales Island. The collections were made at the head of the Bay near the mouth of a creek. About latitude 58° 5′ and longitude 133° 8′.

25. SHUYAK ISLAND. North of Afognack Island. The collections were made along the shore of an unnamed bay, at the southwest corner of the Island. About latitude 58° 30′ and longitude 152° 27′. Not shown on the map.

26. SITKLAN ISLAND. Southeast corner of Alaska. The collections were made along the southwest shore. About latitude 54° 44.5′ and longitude 130° 41′.

27. SNUG HARBOR. Southeast shore of Knight Island in Prince William Sound. About latitude 60° 16′ and longitude 147° 45′. Not shown on the map.

28. ST. JOHN HARBOR. Northwest shore of Zarembo Island. The collections were made within two miles of the shore. About latitude 56° 26′ and longitude 132° 56′.

29. SWIFTS CANNERY. Southeast shore of Heceta Island. The collections were made within quarter of a mile of the cannery. About latitude 55° 43′ and longitude 133° 29′.

30. TAKU INLET. South of Juneau, receiving the Taku and Turner rivers. The collections were made along the east shore of the Inlet at the mouth of Turner River and about four miles south of Taku Glacier. About latitude 58° 25′ and longitude 134° 0′.

31. TAM GAS HARBOR. South shore of Annette Island. The collections were made near the shore from Crab Point northwestward for a distance of about a mile and a half. About latitude 55° 4′ and longitude 131° 33′.

32. VERDURE CREEK. A small stream emptying into Portland Canal near the upper end and about one mile north of Verdure Point. The collections were made near the mouth of the Creek. About latitude 55° 45′ and longitude 130° 10′.

33. WOEWODSKI ISLAND. South entrance to Wrangell Strait.

The collections were made within a quarter of a mile of the abandoned Olympic Mine. About latitude 56° 31′ and longitude 133° 2′.

34. WRANGELL. Near the mouth of the Stikene River. The collections were made within a few miles of the town. About latitude 56° 28′ and longitude 132° 22′.

HEPATICAE COLLECTED BY THE KELP EXPEDITION

In the following enumeration the numbers in parentheses refer to the papers listed in the Bibliography, see page 578. Only those records are quoted which were new at the time they were published. Unless otherwise noted the specimens listed were collected by Professor Frye. The arrangement adopted is that of Schiffner in Engler & Prantl's Die natürlichen Pflanzenfamilien.

MARCHANTIACEAE

1. CONOCEPHALUM CONICUM (L.) Dumort.

On wet soil. Aats Bay (*904*); Augustine Bay (*584*); Hidden Inlet (*59*); Ketchikan (*18*); St. John Harbor (*240*); Swifts Cannery (*693*). Previously reported by Rothrock (**13**, as *Fegatella conica*), Stephani (**14**, p. 99, as *F. conica*), Miss Cooley (**1**, p. 246), and the writer (**3**, p. 290; **4**, p. 129).

2. PREISSIA QUADRATA (Scop.) Nees

On soil among stones. Aats Bay (*937*). Previously reported by Stephani (**14**, p. 99), Miss Cooley (**1**, p. 247, as *P. hemisphaerica*), and the writer (**3**, p. 290; **4**, p. 129).

3. MARCHANTIA POLYMORPHA L.

On damp soil. Calder (*829*); Woewodski Island (*964*). Previously reported by Rothrock (**13**), Stephani (**14**, p. 99), Miss Cooley (**1**, p. 247), and the writer (**3**, p. 291; **4**, p. 129).

METZGERIACEAE

4. RICCARDIA LATIFRONS Lindb.

On bogs, sticks, and wet soil. Calder (*827* in part); Exchange Cove (*261*); Ketchikan (*505*); Nichols Bay (*391*); Port San Antonio

(*609*, *618*); Swifts Cannery (*700*). Previously reported by the writer (**3**, p. 291).

5. RICCARDIA MULTIFIDA (L.) S. F. Gray

On wet rocks and logs. Port Alice (*728* in part); Port Malmsbury (*994*). New to Alaska.

6. METZGERIA CONJUGATA Lindb.

On rocks, trees, and logs. Aats Bay (*900* in part, *907*, *916*, *927*); Augustine Bay (*574*, *579* in part); Brownson Bay (*476*); Exchange Cove (*267*); Hidden Inlet (*58*); Nichols Bay (*369*, *392* in part, *399* in part, *401*); Ratz Harbor (*321*); St. John Harbor (*221*, *250*). New to Alaska.

7. METZGERIA PUBESCENS (Schrank) Raddi

On wet rocks. Hidden Inlet (*80*). Previously reported by Stephani (**14**, p. 98) and Miss Cooley (**1**, p. 247).

8. PALLAVICINIA FLOTOWIANA (Nees) Lindb.

On moist soil. Seward (*Rigg 1216*). Previously reported by the writer (**3**, p. 291, as *P. hibernica*).

9. PELLIA NEESIANA (Gottsche) Limpr.

On wet soil. Aats Bay (*901*); Baranof (*1080*); Ketchikan (*10*, *17*); Ratz Harbor (*301*); St. John Harbor (*241*); Swifts Cannery (*704*). Previously reported by the writer (**3**, p. 293).

JUNGERMANNIACEAE

10. GYMNOMITRIUM OBTUSUM (Lindb.) Pears.

On rocks. Brownson Bay (*481*); Nichols Bay (*380*). Previously reported by the writer (**3**, p. 293, *pl. 16*, *f. 1–3*).

11. MARSUPELLA EMARGINATA (Ehrh.) Dumort.

On wet rocks, soil, and decayed logs. Ketchikan (*9*); Nichols Bay (*373*); Port Malmsbury (*993*); St. John Harbor (*223*, *234*, *251*); Verdure Creek (*35*). Previously reported by the writer (**3**, p. 295; **4**, p. 130) and Howe (**8**, p. 102).

12. NARDIA SCALARIS (Schrad.) S. F. Gray

On wet soil. Ketchikan (*502*); Port Malmsbury (*992*); Shuyak Island (*Rigg 1230*). Previously reported by the writer (**3**, p. 296).

13. GYROTHYRA UNDERWOODIANA M. A. Howe

On wet rocks. Augustine Bay (*545*). New to Alaska.

14. JUNGERMANNIA ATROVIRENS Schleich.

On wet rocks. Port Alice (*730*). Previously reported by the writer (**3**, p. 299; **4**, p. 131).

15. JUNGERMANNIA CORDIFOLIA Hook.

On a log in a streamlet. Port San Antonio (*601*). Previously reported by Stephani (**14**, p. 97) and Howe (**8**, p. 102).

The specimens in the present collection are sterile and are aberrant in having better developed trigones than is usual in the species. In this respect they agree with the specimens cited by Howe.

16. LOPHOZIA FLOERKEI (Web. & Mohr) Schiffn.

In a swampy place. Baranof (*1084* in part). Previously reported by the writer (**3**, p. 304; **4**, p. 131) and Howe (**8**, p. 103).

17. LOPHOZIA INCISA (Schrad.) Dumort.

On decayed logs. Lake Bay (*208*); Nichols Bay (*402*); Ratz Harbor (*307*); Port San Antonio (*623*); Sitklan Island (*44*); Swifts Cannery (*692*, *702*); Tam Gas Harbor (*146*). Previously reported by the writer (**3**, p. 303; **4**, p. 131).

18. LOPHOZIA INFLATA (Huds.) M. A. Howe

In pools. Nichols Bay (*388*); St. John Harbor (*227*). Previously reported by the writer (**3**, p. 304; **4**, p. 131).

19. LOPHOZIA PORPHYROLEUCA (Nees) Schiffn.

On logs and moist soil. Exchange Cove (*275*); Port Chatham (*Rigg 1225* in part); Swifts Cannery (*759*); Taku Inlet (*1027*), Not before reported from Alaska. The species was collected, however, by Miss Lois Clark at Douglas, in October, 1908.

20. LOPHOZIA QUINQUEDENTATA (Huds.) Cogn.

On earth. Mitrofania Bay (*Rigg 1233*). Previously reported by the writer (**3**, p. 304).

21. SPHENOLOBUS EXSECTUS (Schmid.) Steph.

On earth. Mitrofania Bay (*Rigg 1219* in part). New to Alaska.

22. SPHENOLOBUS MINUTUS (Crantz) Steph.

On rocks. Verdure Creek (*31*). Previously reported by Stephani (**12**, p. 97, as *Jungermannia minuta*), the writer (**3**, p. 305, as *Lophozia minuta*) and Howe (**8**, p. 103, as *L. minuta*).

23. ANASTREPTA ORCADENSIS (Hook.) Schiffn.

Jungermannia orcadensis Hook. Brit. Jung. *pl. 17*. 1814.
Mesophylla orcadensis Dumort. Hep. Europ. 130. 1874.
Jungermannia (*Anastrepta*) *orcadensis* Lindb.; Lindberg & Arnell, Kgl. Svenska Vet. Akad. Handl. **23^5**: 40. 1889.
Anastrepta orcadensis Schiffn.; Engler & Prantl, Nat. Pflanzenfam. **1^3**: 85. 1893.

In a swampy place. Baranof (*1084* in part). New to America.

The geographical distribution of *Anastrepta orcadensis* presents several points of interest. In Europe it is more or less abundant in the higher mountain ranges, reaching lower altitudes in the British Isles, the Faroe Islands, and Scandinavia. Then it reappears in the Himalayas, in China, and in the Hawaiian Islands. Its discovery in Alaska marks a very noteworthy extension of its known range.

Although Lindberg knew the plant from sterile material only, he pointed out the fact that it differed markedly from the species of *Jungermannia*, subgenus *Eujungermannia*, section *Lophozia*—the genus *Lophozia* of most recent writers—and proposed the new section *Anastrepta* for its reception. This section was soon raised by Schiffner to generic rank, although he was still in ignorance of the reproductive branches. At the time of its publication as a genus *Anastrepta* was monotypic, but Stephani has recently transferred to it two additional species from the Straits of Magellan.

The habit of *Anastrepta* differs strongly from that of *Lophozia*, the stems being erect or ascending and forming loose tufts. The leaves are succubous and bidentate at the apex, much as in *Lophozia*, subgenus *Dilophozia* K. Müll., but the line of attachment is strongly arched, the leaves being slightly decurrent at the postical base. In this respect the genus shows a relationship to *Plagiochila*. The leaves in *A. orcadensis* are imbricated and spread somewhat widely from the stem. The margin at the antical base is more or less revolute but this condition is much more pronounced at the postical base, the narrow revolute portion being quite unlike anything found in *Lophozia*. The apical sinus and lobes are subject to considerable variation. The sinus is always shallow and is sometimes scarcely apparent, the apex of the leaves appearing truncate. The lobes are sometimes nothing more than rounded corners and are usually rounded or very obtuse even when more distinct. Occasionally, however, they are more sharply pointed. The leaf-cells are small, measuring about 16 μ in diameter in the middle of the leaf and 20×16 μ at the base. Their walls are thin and their small trigones have concave or straight sides. The cuticle is smooth.

Soon after Schiffner published *Anastrepta* as a genus the androecia and perianths were described by Jörgensen from Norwegian material, and K. Müller has recently added an account of the sporophyte from specimens collected by J. Velenovský near Prague. According to Jörgensen* the perianths are slightly laterally compressed, but K. Müller was unable to confirm his observations and describes the perianths as bluntly four-angled in the upper part and plicate at the contracted mouth. The perianths, therefore, are essentially like those of *Lophozia*, and the same thing may be said of the androecia and sporophytes. At the same time the peculiar features of the vegetative organs are sufficient to justify the maintenance of *Anastrepta* as a genus. The specimens from Baranof are not abundant and lack sexual organs. Some of the leaves, however, bear clusters of the characteristic two-celled gemmae, which are deeply pigmented with purple and often show an angular outline. K. Müller† and Macvicar‡ may be consulted for descriptions and figures of the species, while Schiffner* has given a full account of its more important forms.

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* Bergens Mus. Aarb. 1894–95^{18}: 3–5. *pl. 1;* 1901^{4}: 3–5. *pl. 1.*

† Rabenhorst's Kryptogamen-Flora **6**: 753. *f. 336, 337.* 1910.

‡ Student's Handb. British Hepat. 213. *f. 1–4.* 1912.

24. PLAGIOCHILA ASPLENIOIDES (L.) Dumort.

On damp rocks, soil, and logs. Augustine Bay (*544*); Hidden Inlet (*60*); Lake Bay (*205*); Mitrofania Bay (*Rigg 1219* in part); Port Alice (*724*, *728* in part); Shipley Bay (*767*, *778*); St. John Harbor (*230*, *246*); Swifts Cannery (*691*); Tam Gas Harbor (*130*). Previously reported by Coville (2) and the writer (3, p. 305; 4, p. 131).

25. **Plagiochila alaskana** sp. nov.

On logs. Nichols Bay (*392* mostly, *399* mostly). No. 399 may be designated the type. The accompanying species are *Metzgeria conjugata* (mixed with both numbers), *Diplophyllum albicans* (mixed with *392*), and *Frullania nisquallensis* (mixed with *399*).

Yellowish or brownish green, not glossy, growing in compact tufts: stems mostly 2–3 cm. long and about 0.15 mm. in diameter, rigid, ascending, simple or sparingly and irregularly branched, the branches all intercalary, obliquely spreading, similar to the stems: rhizoids sometimes present near the base: leaves alternate, more or less imbricated, spreading at an angle of 45 degrees or less, postically secund and often deflexed in the outer part, more or less convex, ovate, mostly 1–1.4 mm. long (from middle of base to apex) and 0.7 mm. wide, long-decurrent antically, less decurrent postically, the decurrent portions narrow and the line of attachment strongly arched; antical margin revolute to about the middle, straight or slightly outwardly curved (on explanate leaves), entire to about the middle, sharply dentate or ciliate-dentate in the outer part; postical margin more strongly outwardly curved, sometimes slightly dilated toward the base, sharply dentate or ciliate-dentate; apex broad and rounded with teeth like those on the postical margin; total number of teeth mostly twenty to twenty-five, unequal, three to six cells long, one to three cells wide at the base; leaf cells plane, averaging 14 μ in the apical portion, 21×14 μ in the middle, and 40×14 μ at the base, walls more or less thickened with well-developed triangular trigones, sometimes with bulging sides, and rare intermediate thickenings, coalescence between thickenings frequent, especially in median and basal regions, cuticle smooth: underleaves very minute:

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* Ber. naturw.-med. Ver. Innsbruck **31** (Beilage): 22–31. 1908.

inflorescence dioicous: ♀ inflorescence borne on the stem or on a leading branch, often with one or two subfloral innovations; bracts similar to the leaves and intergrading into them; innermost bracts about 1.5 mm. long and 1 mm. wide, the marginal teeth about twenty-five, usually longer than those on the leaves, an occasional tooth sometimes attaining a length of seven or eight cells; perianth narrowly obovate, about 2.7 mm. long and 1 mm. wide, strongly compressed, the sharp keels destitute of wings, sharply and densely ciliate at the truncate mouth: ♂ inflorescence and sporophyte not seen. (PLATE 21, FIGS. 1–6.)

This and the following species are closely allied but have no near relatives among the other species known from North America. Some of the East Indian species resemble them to a certain extent, and the same thing is true of various Andean species. The writer finds it impossible, however, to refer them to any described species and therefore proposes them as new, in spite of the fact that the species of *Plagiochila* are already so numerous and so incompletely understood.

In *P. alaskana* the following characters are perhaps the most important from a diagnostic standpoint: the simple or sparingly branched stems; the intercalary branches: the postically secund and often deflexed leaves; the narrowly arched line of attachment, the antical base being remarkably long-decurrent; the dentate or ciliate-dentate leaf-margins; the group of elongated cells at the base of the leaves; the exalate perianths. These peculiarities would place the species in Schiffner's section *Denticulatae*,* a well-marked group which Stephani unfortunately does not recognize.

Among the species of this group growing in tropical Asia mention may be made of two, *P. renitens* Nees,† of Java, Sumatra, and India, and *P. trapezoidea* Lindenb.,‡ of Java. In both of these species the characters just enumerated for *P. alaskana* are more or less clearly exhibited. Both species, however, are considerably larger, the stems sometimes attaining a length of 10 cm. and the leaves a length of 2.5 mm. or more. The leaves, moreover, are relatively broader, the ratio of width to length being 0.9 instead of only 0.7–0.75 as in *P. alaskana.* The greater relative breadth is due largely to a strong dilation at the postical base. The marginal teeth in the two Asian species are much like those in *P. alaskana* but usually number from thirty to forty. In *P. renitens* the decurrent portion at the antical base is entire, but in *P. trapezoidea* it is distinctly dentate and the species is further remarkable on account of the short and narrow lamina or paraphyllium which runs parallel with the decurrent portion and is situated in its near vicinity. In *P. renitens* the deflexed and postically secund habit is particularly well marked. The cells in both Asian species are somewhat larger than in *P. alaskana*, those in the apical portion measuring about 20 μ in diameter those in the middle about 30×20 μ, and the elongated basal cells about 60×20 μ; the trigones, especially in *P. trapezoidea*, are more clearly defined than in *P. alaskana*, coalescence being less prevalent.

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* Die Hepaticae der Flora von Buitenzorg. Fl. Buitenzorg 4: 106. 1900.

† Lindenberg, Monogr. Hepat. Gen. *Plagiochilae* 90. *pl. 17, f. 1–6.* 1844 (=*Jungermannia renitens* Nees, Enum. Plant. Crypt. Javae 1: 76. 1830).

‡ *L. c.* 112. *pl. 22, f. 1–18.* 1844.

To a considerable extent the section *Denticulatae* of Schiffner corresponds with the section *Heteromallae* of Spruce.* Of this group, to which Spruce refers thirteen South American species, the following may be profitably compared with *P. alaskana: P. pachyloma* Tayl.,† *P. oxyphylla* Spruce,‡ and *P. fragilis* Tayl.,§ all of Ecuador. These three species show most of the characters emphasized under *P. alaskana*, although the elongation of the basal cells is not apparent in either *P. pachyloma* or *P. oxyphylla*, nor is the deflexed and postically secund habit always marked.

In *P. pachyloma* the leaves are almost as broad as long and measure about 2.2 cm. in length in the specimens studied by the writer, although Spruce gives a length of 2.75 mm. and Stephani a length of 3 mm. The postical base is strongly dilated, the antical margin is entire except near the apex, while the postical margin and the apical region are sharply spinose-dentate. The total number of teeth being about thirty. The species is peculiar in the brownish pigmentation of the teeth, in the strongly thickened walls of their elongated cells, and in the elongated cells with thickened walls which form a border along the antical margin.

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* Hep. Amaz. et And. 458. 1885.

† Jour. Bot. 5: 267. 1846.

‡ Hep. Amaz. et And. 480. 1885.

§ Jour. Bot. 7: 284. 1848.

In *P. oxyphylla* the leaves are relatively narrower than in *P. pachyloma*, measuring about 2×1.6 mm. The antical margin is entire, the apex is usually tipped with a single acuminate tooth, although a second smaller tooth is sometimes present at the antical base of the apical tooth, or the apex may even be subequally bispinose. The postical margin bears from fifteen to eighteen sharp teeth or cilia, which are crowded toward the base and more scattered toward the apex.

In *P. fragilis* the leaves are always deflexed and postically secund, and the basal leaf-cells are always distinctly elongated. When well developed the leaves measure about 1.7 mm. in length and 1.4 mm. in width, ratio of width to length thus being about 0.8. The antical leaf-margin is entire, the dilated postical margin bears from twelve to sixteen spinose teeth, and the apex is usually unequally bidentate, the larger tooth being longer than the postical teeth. In some cases there is only one apical tooth. The leaf-cells in *P. fragilis* measure about 20 μ in diameter at the apex, 30×20 μ in the middle, and 50×20 μ in the basal region. The trigones, separated from one another by narrow pits, are unusually well developed, making the cell-cavities distinctly stellate; coalescence between trigones is not infrequent.

26. **Plagiochila Fryei** sp. nov.

On a dry tree base. Augustine Bay (*579*). A slight admixture of *Metzgeria conjugata* is present.

Yellowish or brownish green, not glossy, growing in compact tufts: stems mostly 2–3 cm. long and 0.15 mm. in diameter, rigid, ascending, mostly simple, rarely with an occasional branch, the branches all intercalary, obliquely spreading, similar to the stems: rhizoids sparingly produced: leaves alternate, more or less imbricated, spreading at an angle of 45 degrees or less, postically secund and often deflexed in the outer part, more or less convex, orbicular-ovate to orbicular (exclusive of the decurrent portions), about 1.4 mm. long (when well developed) and 1.2–1.4 mm. wide, long-decurrent antically, less decurrent postically, the decurrent portions narrow, line of attachment strongly arched; antical margin revolute to about the middle, outwardly curved (on explanate leaves), entire to the middle or beyond, sometimes bearing one to three broad and short teeth in the outer part; postical margin strongly outwardly curved and dilated toward the base, sharply spinose-dentate; apex broad and rounded with teeth like those along the postical margin; total number of teeth mostly twelve to fifteen, unequal and variable, pointing in various directions, mostly acuminate but sometimes merely acute, mostly two to six cells long and one to five cells wide at the base; leaf-cells plane, averaging 14 μ in the apical portion, 22×14 μ in the middle, and 40×14 μ at the base, walls more or less thickened with well-developed but poorly defined trigones, the sides being straight or concave; coalescence between the trigones frequent especially in the median and basal portions, cuticle smooth: underleaves minute: remaining parts not seen. (PLATE 21, FIGS. 7–9.)

It will be seen from the above description that *P. Fryei* and *P. alaskana* are very closely related species and that most of the vegetative characters emphasized under *P. alaskana* are exhibited equally well by *P. Fryei*. In spite of these facts it still seems justifiable to consider the two plants distinct. The differences between them are found in the form of the leaves and in the peculiarities of the marginal teeth. The leaves of *P. alaskana* are relatively narrower than in *P. Fryei*, the ratio of width to length being only 0.7–0.75 instead of 0.85–1. As in the two species of tropical Asia, discussed under *P. alaskana*, the greater relative breadth in *P. Fryei* is due to the marked dilation of the postical base, a feature which appears to be constant. The marginal teeth in *P. alaskana* are more numerous than in *P. Fryei* and tend to be narrower and more sharply pointed; they extend farther back toward the antical base and usually spread out widely from the margin, instead of being variously directed. The cell-structure is very much the same in the two species, the middle lamellae are usually discernible, and the cell-measurements are practically identical. In *P. alaskana* the trigones are somewhat more distinct and sometimes have bulging sides; in *P. Fryei* the trigones, although well-developed, more frequently coalesce, thus making the walls appear uniformly thickened, and their sides are concave or straight. These differences, however, can not be regarded as very important in such a genus as *Plagiochila*, where the thickenings in the walls are subject to considerable variation.

The Asian and South American species contrasted with *P. alaskana* may be considered in connection with *P. Fryei* also.

They approach this species rather more closely than they do *P. alaskana* in having broader leaves more constantly and more strongly dilated at the postical base, but most of the other differences which distinguish them from *P. alaskana* would distinguish them from *P. Fryei* as well.

27. MYLIA ANOMALA (Hook.) S. F. Gray

In a bog. Metlakatla (*105*). New to Alaska.

28. MYLIA TAYLORI (Hook.) S. F. Gray

On logs. Augustine Bay (*Foster 575; 760*); Ketchikan (*542*); Morse Cove (*440*); Nichols Bay (*370*); Port Alice (*Foster 787* in part); Port Chatham (*Rigg 1225* in part); Port Antonio (*608*); Saltery Cove (*327*); St. John Harbor (*248*). Previously reported by the writer (**3**, p. 305).

29. LOPHOCOLEA CUSPIDATA (Nees) Limpr.

On a tree. Swifts Cannery (*686*). Previously reported by the writer (**3**, p. 306).

30. CHILOSCYPHUS PALLESCENS (Ehrh.) Dumort.

On a wet log. Aats Bay (*911*). New to Alaska.

31. CHILOSCYPHUS RIVULARIS (Schrad.) Loeske

On wet rocks and soil. Egg Harbor (*945*); Saltery Cove (*333*). Previously reported by Miss Cooley (**1**, p. 246, as *Ch. polyanthus*, var. *rivularis*).

32. GEOCALYX GRAVEOLENS (Schrad.) Nees

On moist soil. Snug Harbor (*Rigg 1222*). New to Alaska.

33. CEPHALOZIA BICUSPIDATA (L.) Dumort.

On logs, rocks, and soil, often in very damp localities. Aats Bay (*918*); Augustine Bay (*572, 585, 587, 588*); Exchange Cove (*263, 266, 272*); Ketchikan (*498*); Morse Cove (*454*); Nichols Bay (*381, 403*); Port San Antonio (*622*); Ratz Harbor (*308*); Snug Harbor (*Rigg 1217*); St. John Harbor (*228*); Swifts Cannery (*695, 703, 718*); Tam Gas Harbor (*137, 149*). Previously reported by the writer (**3**, p. 306).

34. CEPHALOZIA LEUCANTHA Spruce

On earth. Port Chatham (*Rigg 1225* in part). Previously reported by the writer (**3**, p. 306, *pl. 42, f. 18–26*).

35. CEPHALOZIA MEDIA Lindb.

On rocks and soil. Augustine Bay (*589, 595*); Port San Antonio (*610*); Ratz Harbor (*300*). Previously reported by Miss Cooley (**1**, p. 246, as *C. multiflora*), Coville (**2**, as *C. multiflora*), and the writer (**3**, p. 306).

36. CEPHALOZIELLA BYSSACEA (Roth) Warnst.

On humus. Woewodski Island (*Foster 966*). Previously reported, as *Cephalozia divaricata*, by Coville (**2**) and the writer (**3**, p. 308; **4**, p. 131).

37. CALYPOGEIA NEESIANA (Massal. & Carest.) K. Müll.

On logs. Augustine Bay (*594*); Egg Harbor (*943*). Not before reported from Alaska. A specimen, however, from Columbia Fiord, Prince William Sound, *Coville & Kearney 1399*, belongs here. Reported by the writer (**3**, p. 308, as *Kantia Trichomanis*).

38. CALYPOGEIA TRICHOMANIS (L.) Corda

On logs and wet soil. Morse Cove (*444*); Port San Antonio (*624*); Verdure Creek (*34*). Previously reported, as *Kantia Trichomanis*, by Miss Cooley (**1**, p. 246), Coville (**2**), and the writer (**3**, p. 308).

39. BAZZANIA PEARSONI Steph.

Bazzania Pearsoni Steph. Hedwigia **32**: 212. 1893.
Mastigobryum Pearsoni Steph. Bull. Herb. Boissier II. **8**: 852. 1908.
Pleuroschisma Pearsoni K. Müll. Rabenhorst's Kryptogamen-Flora **6**^{2}: 272. 1913.

Among mosses at the base of a tree. Metlakatla (*109* in part, *113*). New to America.

The discovery of this very rare European species in Alaska is of much interest from the standpoint of geographical distribution. It was based on material collected at Killarney, Ireland, by Stewart and Holt in 1885. It was found a second time at Slievemore, Achill Island, off the western coast of Ireland, by Jones and Duncan in 1911. No other stations have been reported. Through the kindness of Miss Haynes the writer has been enabled to compare material from both Irish stations with the specimens from Alaska, and finds that they agree in all essential respects. In No. 109 the species grew mixed with *Herberta adunca*.

In size and general habit *B. Pearsoni* bears a strong resemblance to the typical forms of *B. tricrenata*. The leaves, especially when dry, are umbricated and strongly decurved in both species, while the apex is usually bi- or tridentate with variable teeth. The distinctive characters of *B. Pearsoni* are the following: the strongly dilated antical portion of the leaves, the lack of distinct teeth on the underleaves, the very large trigones in the cells of both leaves and underleaves. The antical portion is so strongly dilated that it makes the leaf arch considerably beyond the axis and forms a cordate expansion at the base. The trigones in typical cases are separated by narrow pits with straight sides, the cell-cavities being distinctly stellate; the sides of the trigones are strongly convex or truncate, and coalescence of trigones is not infrequent. The middle lamellae are very distinct. The underleaves are contiguous to imbricated and are rounded or subcordate at the base; in outline they vary from orbicular to broadly ovate, the lateral margins are somewhat outwardly curved and are often reflexed at the base, and the apex is truncate or slightly retuse. Full descriptions of *B. Pearsoni*, with figures, may be found in Pearson's Hepaticae of the British Isles (p. 133, *pl. 50*) and in Macvicar's Student's Handbook of British Hepatics (p. 319, *f. 1–4*).

Among exotic species which are allied to *B. Pearsoni*, the Hawaiian *B. Didericiana* (Gottsche) Steph.* may be particularly noted. In this species, which is about as large as *B. Pearsoni*, the leaves are much less convex and are also less dilated in the antical portion, while the underleaves are almost constantly toothed at the truncate apex, the teeth being very variable. The leaves differ further in the fact that they are less narrow toward the apex. The leaf-cells with their large and strongly developed trigones are much the same in the two species.

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* See C. M. Cooke, Jr. Trans. Connecticut Acad. **12**: 15. *pl. 4, f. 1–13.* 1904. In his Species Hepaticarum (Bull. Herb. Boissier II. **8**: 775. 1908) Stephani has changed the name of this species to *Mastigobryum Didrichsenii.*

40. BAZZANIA TRICRENATA (Wahl.) Trevis.

On rocks and logs. Aats Bay (*908*); Augustine Bay (*543*, *571*, *578*, *590*); Exchange Cove (*278*, *279*); Hidden Inlet (*63*, *86*); Lake Bay (*210*); Morse Cove (*452*); Nichols Bay (*368*); Port Alice (*Foster 785*, *Foster 786*, *Foster 787* in part); Port Malmsbury (*980*, *982*); Port San Antonio (*606*, *616*, *617*, *645*); Ratz Harbor (*298*); Shipley Bay (*762*, *763*, *774*); Sitklan Island (*47*, *50*); Snug Harbor (*Rigg 1221*); St. John Harbor (*865*); Swifts Cannery (*687*, *690*); Tam Gas Harbor (*119*, *134*, *136*, *148*); Verdure Creek (*23*). Previously reported by Stephani (**14**, p. 97, as *Mastigobryum deflexum*), Miss Cooley (**1**, p. 246, as *Bazzania deflexa*), and the writer (**3**, p. 308, as *B. deflexa*).

41. BAZZANIA TRILOBATA (L.) S. F. Gray

On rocks in woods. Baranof (*1084* in part); Verdure Creek (*21*). New to Alaska and apparently to the Pacific Coast region.

42. LEPIDOZIA FILAMENTOSA (Lehm. & Lindenb.) Lindenb.

On rocks and soil. Augustine Bay (*581*); Port San Antonio (*644*, *Foster 1120*); Shipley Bay (*1124*); Verdure Creek (*30*). Previously reported by Howe (**7**, p. 138) and the writer (**3**, p. 308).

43. LEPIDOZIA REPTANS (L.) Dumort.

On rocks, soil, and logs. Augustine Bay (*595* in part); Baranof (*1088*); Exchange Cove (*271*): Taku Inlet (*1035*). Previously reported by Miss Cooley (**1**, p. 246), Coville (**2**), and the writer (**3**, p. 308).

44. LEPIDOZIA SANDVICENSIS Lindenb.

Lepidozia sandvicensis Lindenb.; G. L. & N., Syn. Hep. 201. 1845. Lindenberg & Gottsche, Sp. Hep. **6**: 12. *pl. 1*, *f. 1–5*. 1846. C. M. Cooke, Jr., Trans. Connecticut Acad. **12**: 7. *pl. 2*, *f. 1–12*. 1904.*

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* A few synonyms are recorded here.

On soil in very damp woods. Augustine Bay (*684*, *Foster 2475*); Port San Antonio (*652*). New to America. Heretofore known only from the mountains of the Hawaiian Islands, where it was collected many years ago by Tolmie and more recently by Baldwin.

It may perhaps appear hazardous to refer an Alaskan plant to a species of the Hawaiian Islands, but a careful comparison of the specimens noted above with material collected by Baldwin on the island of Maui has failed to bring to light any essential differences. It should be admitted, however, that *L. sandvicensis* is known from the Hawaiian Islands in sterile condition only and that the Alaskan material is equally destitute of female inflorescences. It is possible, therefore, that the discovery of perichaetial bracts and perianths may bring to light differential characters necessitating the segregation of the American plant as a distinct species.

The description and figures of Lindenberg give a clear general idea of the species, while a number of additional details are supplied by Cooke. *L. sandvicensis* belongs to a fairly well-defined group of *Lepidoziae* which are mostly of tropical distribution. They are characterized by pinnate stems with subdivided branches, the stems being limited in growth and blunt, the branches being likewise limited in growth but tapering out into slender flagella. The branches are of about the same length and give the entire shoot system a loosely plumose appearance. The group is further characterized by very minute leaves and underleaves, which are mostly far apart. Most of the photosynthesis is therefore carried out by the green axes, and the plants, in some cases at least, look almost as if they belonged to the thallose genus *Riccardia*.

In *L. sandvicensis* the main stem is somewhat flattened dorsoventrally, measuring about 0.5×0.3 mm. in section, and is bounded by a layer of short cells arranged in from forty to sixty longitudinal rows. These cells have thickened walls and measure about 20 μ in width. The internal cells average about 15 μ in width and have somewhat thinner walls. Rhizoids are wanting except near the tips of some of the flagelliform branches. The leaves and underleaves are so well described by Cooke that only a few of their more important features need be noted here. The stem leaves are almost transversely attached and extend obliquely outward, scarcely, if at all, projecting beyond the stem. The antical edge is a little longer than the postical, the leaf thus being slightly unsymmetrical. In well-developed leaves the antical edge is about 0.3 mm. long, the postical about 0.2 mm. and the breadth at the base of the leaf about 0.4 mm. The leaves are normally quadrifid to below the middle with subulate acute lobes, ending in a single cell or in a row of two or three cells, and usually separated by acute sinuses. The underleaves are similar but smaller, being only 0.25 mm. in width. The leaf-cells measure about 30×22 μ in the middle of the leaf and have thickened walls with indistinct trigones. The cuticle is smooth throughout.

The specimens from Augustine Bay show male inflorescences and indicate that the species is probably dioicous. The androecia occupy very short postical branches growing in the axils of the underleaves on the main stem. They are not abundant, the highest number observed on an individual stem being five. The concave bracts are crowded and borne in from two to four pairs, each bract enclosing one or two antheridia in its axil. No case of proliferation was observed, a condition apparently associated with the delicacy of the entire inflorescence. The individual bracts are subject to considerable variation in size and complexity. One of the best developed was 0.45 mm. long and 0.6 mm. wide. It was four-lobed to about the middle, the divisions and sinuses being acute. The margins of the divisions, although mostly entire, showed an occasional small tooth formed by a projecting cell. Other bracts showed only three lobes and sometimes the marginal denticulation was more pronounced. A well-developed bracteole measured 0.15 mm. in length and 0.25 mm. in width, and was likewise quadrifid to about the middle with acute entire lobes and sinuses, each lobe being two or three cells long and two cells wide at the base. The cells of both bracts and bracteoles are characterized by thin walls with vague indications of trigones toward the apices of the lobes. In the bracts the cells measure about 30×24 μ. The antheridia are about 0.15 mm. in diameter.

There is no danger whatever of confusing *L. sandvicensis* with any of the other species of *Lepidozia* now known from the Pacific Coast region of North America. In both *L. reptans* and *L. filamentosa*, which occur in the present collection, the leaves are much larger and are often imbricated, so that the shoots bear no resemblance to those of *Riccardia*. In *L. setacea*, reported from Alaska and probably occurring in British Columbia, the plants are much smaller, while the deeply quadrifid, crowded, concave leaves with slender divisions are relatively much larger. Among European species *L. Pearsoni* Spruce,* of the British Isles and Norway, comes somewhat nearer to *L. sandvicensis* on account of its lax habit and distant leaves and underleaves. But in this species the leaves and underleaves are considerably larger than in *L. sandvicensis*, the leaves are occasionally five- or six-lobed, the androecia are usually terminal on long lateral branches and the antheridia occur singly. Since *L. Pearsoni* has been found in company with *Anastrepta orcadensis* there is a possibility that it may yet be discovered in Alaska. At the present time the perianths are unknown, although the female inflorescence has been described.

45. BLEPHAROSTOMA TRICHOPHYLLUM (L.) Dumort.

On soil, rocks, and logs. Aats Bay (*932*); Augustine Bay (*573*); Hidden Inlet (*67*); Sitklan Island (*43*); Verdure Creek (*37*). Previously reported by Rothrock (**13**, as *Jungermannia trichophylla*), Coville (**2**), and the writer (**3**, p. 308; **4**, p. 132).

46. ANTHELIA JULACEA (L.) Dumort.

On rocks. Port Malmsbury (*986*). Previously reported by the writer (**3**, p. 309; **4**, p. 132).

47. HERBERTA ADUNCA (Dicks.) S. F. Gray

On trees and rocks. Aats Bay (*925*); Augustine Bay (*561, Foster 677*); Brownson Bay (*470, Foster 517*); Metlakatla (*Wylie 76, Wylie 97, 109* in part); Morse Cove (*446*); Nichols Bay (*384*); Port San Antonio (*605, 649*); Ratz Harbor (*309*); Saltery Cove (*320*). Previously reported by Underwood (**16**, p. 366), Merriam (**9**), and the writer (**3**, p. 309).

48. PTILIDIUM CALIFORNICUM (Aust.) Underw. & Cook

On trees, bushes, and logs. Hidden Inlet (*92*); Port Malmsbury (*980*); Shipley Bay (*Foster 779*); Verdure Creek (*26*). Previously reported by the writer (**3**, p. 309).

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* Jour. Bot. **19**: 34. 1881. See also Pearson, Hep. British Isles 121. *pl. 45*, 1900; Macvicar, Student's Handb. British Hepat. 325. *f. 1–5*. 1912; and K. Müller, Rabenhorst's Kryptogamen-Flora 6^2: 284. *f. 86*. 1914.

49. PTILIDIUM CILIARE (L.) Nees

On rocks. Taku Inlet (*1026*). Previously reported by Stephani (**14**, p. 97) and the writer (**3**, p. 309; **4**, p. 132).

50. PTILIDIUM PULCHERRIMUM (Web.) Hampe

On logs and stumps. St. John Harbor (*245*); near Wrangell (*Foster 1122*). Previously reported by Stephani (**15**, vol. 4, p. 43).

51. DIPLOPHYLLUM ALBICANS (L.) Dumort.

On logs, trees, and soil. Calder (*835*); Brownson Bay (*474*); Exchange Cove (*276*); Lake Bay (*197*, *211*); Morse Cove (*439*); Port San Antonio (*647*); Shuyak Island (*Rigg 1227*); Swifts Cannery (*696*); Tam Gas Harbor (*128*). Previously reported by Rothrock (**13**, as *Jungermannia albicans*) and the writer (**3**, p. 309, as *Diplophylleia albicans*).

52. DIPLOPHYLLUM OVATUM (Dicks.) Steph.

On logs and trees. Brownson Bay (*473*); Nichols Bay (*386*); Port Malmsbury (*989* in part). Previously reported by the writer (**3**, p. 305, as *Lophozia ovata*).

53. DIPLOPHYLLUM PLICATUM Lindb.

On trees and rocks. Baranof (*1084* in part); Exchange Cove (*274*); Ratz Harbor (*293*); Saltery Cove (*331*). Previously reported by the writer (**3**, p. 309, *pl. 17*, *18*, *f. 27–35*, as *Diplophylleia plicata*).

54. DIPLOPHYLLUM TAXIFOLIUM (Wahl.) Dumort.

On rocks and logs. Deweyville (*Foster 789*); Seward (*Rigg 1228*); St. John Harbor (*243*); Verdure Creek (*27*). Previously reported by Gottsche, Lindenberg, and Nees von Esenbeck (**5**, p. 76, as *Jungermannia albicans*, var. *taxifolia*), Merriam (**9**), and the writer (**3**, p. 309, as *Diplophylleia taxifolia;* **4**, p. 132, under the same name).

55. SCAPANIA BOLANDERI Aust.

On logs, trees, and rocks. Augustine Bay (*582*); Brownson Bay (*469*); Hidden Inlet (*79*, *89*, *90*); Lake Bay (*207*, *209*, *213*); Morse Cove (*441*, *442*, *443*); Port Alice (*Foster 787*); Port Chatham

(*Rigg 1226*, *1234*) Port Malmsbury (*984*); Port San Antonio (*600*, *604*, *613*); Ratz Harbor (*295*, *304*); Sitklan Island (*48*); Snug Harbor (*Rigg 1218*); St. John Harbor (*232*); Swifts Cannery (*698*, *712*); Tam Gas Harbor (*117*, *118*, *124*, *125*); Verdure Creek (*22*). Previously reported by Stephani (**14**, p. 96, *pl. 3*, *f. 9*, as *Scapania albescens*), Pearson (**12**, p. 14), the writer (**3**, p. 311), and K. Müller (**11**, p. 186).

56. SCAPANIA CORDIFOLIA K. Müll.

Scapania cordifolia K. Müll. Bull. Herb. Boissier II. **3**: 38. 1903. Nova Acta Kaiserl. Leop.-Carol. Acad. **88**: 91. *pl. 7b*, *f. 1–7*. 1905.

Scapania paludosa papillosa K. Müll.; L. Clark, Bull. Torrey Club **36**: 306. *pl. 20*, *f. 12–17*. 1909.

On wet rocks and soil, often in running water. Augustine Bay (*593*); Morse Cove (*424*); Port Malmsbury (*999*, *1000*); Saltery Cove (*328*); St. John Harbor (*218*). Previously reported by K. Müller (**10**, p. 38), as noted above. The following stations to the southward of Alaska may likewise be quoted: near Skidegate, Queen Charlotte Islands, British Columbia, *W. Spreadborough 83171*, July, 1910; near Hume's Glacier, Queets River valley, Olympic Mountains, Washington, *T. C. Frye 88*, August, 1907 (type of *S. paludosa papillosa*).

The present species was based on Alaska material collected at Columbia Fiord by Coville and Kearney, while members of the Harriman Expedition (No. 1383). In the writer's account of the Hepaticae of this expedition these specimens were referred to *S. undulata*, a species then understood in a much broader sense than at the present time (**3**, p. 365). In proposing *S. cordifolia* as a new species Müller spoke of the great diversity which he found between sterile plants and those bearing perianths, and he emphasized the fact that the fertile plants were scarcely distinct from *S. dentata*, a species not definitely known from America at that time but since then reported from numerous scattered localities. The writer now finds, upon examining Coville and Kearney's material again, that some of the perianth-bearing plants agree fully with the sterile plants of Müller's description, and that the discrepancies between sterile and fertile plants which he emphasizes do not actually exist. It would appear, in fact, that what he considered to be fertile material of *S. cordifolia* is really *S. dentata* and that *S. cordifolia*, as originally understood, was a composite species. This being the case two courses are possible. *S. cordifolia* might be regarded as a simple synonym of *S. dentata*, since the fertile plants of *S. cordifolia*, as understood by Müller, belong to *S. dentata;* or the name *S. cordifolia* might be retained for the sterile plants which Müller studied. It is evident that he laid most stress on these sterile plants and that he drew all of his figures from them except figure 7. The writer suggests, therefore, that the second course be followed and that the species *S. cordifolia* be retained with emended characters.

The plants of *S. cordifolia* are robust and more or less pigmented with purplish red. The leaves are imbricated and are especially remarkable on account of their very short and usually arched keels. The antical lobe spreads obliquely while the postical keel extends at almost a right angle from the stem. Both lobes are strongly dilated just beyond the keel, thus giving the leaf a cordate appearance. Both lobes are minutely and sharply denticulate, and most of the teeth are unicellular, although an occasional tooth may be two cells long. In some cases both lobes are abruptly and narrowly decurrent, but this condition is by no means constant, some of the leaves being only slightly or not at all decurrent. The leaf-cells are subject to considerable variation in size. In one case the cells at the apex of the postical lobe were found to measure about 16 μ in diameter, those in the middle about 30×24 μ, and those at the base about 40×24 μ. In other cases the median and basal cells were only 18 μ wide, and the measurements given by Müller show further slight differences. Along the margin of the lobes the cell walls appear to be uniformly thickened with poorly developed trigones, but toward the middle the deeply pigmented and clearly defined trigones usually form a conspicuous feature of the cells. Even here, however, the trigones are not always distinct and the walls may appear to be of about the same thickness throughout. The cuticle is distinctly verruculose.

The perianths are borne on the main stems or on leading branches, and the bracts are much like the leaves. The innermost bracts differ in having a slightly longer keel and more obliquely spreading lobes, and in lacking the cordate dilations so marked on both lobes of typical leaves at the end of the keel. In one inflorescence studied particularly the antical lobe was ovate, and measured 1.6×1.2 mm. The apex was very bluntly pointed and the margin, throughout the greater part of its length, bore scattered, short, sharp teeth, each consisting usually of a single cell. The postical lobe was oblong-ovate and measured 2.8×1.5 mm. The apex was more rounded and the margin like that of the antical lobe. The perianth was obovate with a broad truncate mouth and measured 3×1.8 mm. The mouth bore about fifty teeth, variously directed and irregularly scattered, each being one or two cells long. None of the inflorescences studied had been fertilized, so that the characteristics of the sporophyte are still unknown.

In his original description, Müller compares *S. cordifolia* with *S. dentata* and *S. uliginosa*. As emended above the plant is evidently much closer to *S. uliginosa* than to *S. dentata*, and shows further a marked resemblance to certain forms of *S. paludosa* K. Müll. The writer, in fact, would consider the var. *papillosa* of *S. paludosa* a synonym of *S. cordifolia*, as indicated above. In both *S. uliginosa* and *S. paludosa* the keels of the leaves are short and usually strongly arched, the lobes are more or less dilated just beyond the end of the keel, and both lobes are more or less decurrent at the base, the decurrence sometimes being very strongly pronounced. In *S. cordifolia* the first two of these features are exhibited in a marked degree, but the third feature is sometimes less conspicuous and may be lacking altogether as Müller's description indicates. *S. uliginosa* is distinguished at once by the fact that the margins of the leaves are entire throughout, although the mouth of the perianth occasionally bears a few scattered teeth. *S. paludosa* is distinguished by its paler color and more delicate texture, the walls of the leaf-cells being only slightly thickened, by its more distant leaves, by the entire margins of its antical lobes, and by the less marked denticulation of its postical lobes.

57. SCAPANIA DENTATA Dumort.

On wet rocks, often in running water. Aats Bay (*906*); Augustine Bay (*540*); Mitrofania Bay (*Rigg 1231*); Port San Antonio (*603*); Saltery Cove (*323*). See notes under *S. cordifolia*, where *S. dentata* is reported for the first time from Alaska.

58. SCAPANIA IRRIGUA (Nees) Dumort.

On moist earth. Mitrofania Bay (*Rigg 1232*); the specimens are scanty and not altogether typical. Previously reported by the writer (**3**, p. 312) and K. Müller (**11**, p. 80).

59. SCAPANIA NEMOROSA (L.) Dumort.

On rocks and soil. Aats Bay (*912*, *938*); Morse Cove (*435*); Port Alice (*Foster 784*). Previously reported by Rothrock (**13**, as *Jungermannia nemorosa*), Stephani (**14**, p. 97), and Miss Cooley (**1**, p. 247).

60. SCAPANIA ULIGINOSA (Sw.) Dumort.

In running water. Ketchikan (*504*). New to Alaska.

61. SCAPANIA UMBROSA (Schrad.) Dumort.

On logs and trees. Calder (*827* in part); Ratz Harbor (*305*); Swifts Cannery (*Foster 761*). Previously reported by the writer (**3**, p. 312).

62. SCAPANIA UNDULATA (L.) Dumort.

On wet rocks and soil, often in running water. Ketchikan (*3*); Morse Cove (*438*); Port Malmsbury (*978*, *997*); Port San Antonio (*599*); Snug Harbor (*Rigg 1220*); Swifts Cannery (*688*). Previously reported by the writer (**3**, p. 311; **4**, p. 131) and Howe (**8**, p. 104).

63. RADULA BOLANDERI Gottsche

On rocks, trees, and logs. Augustine Bay (*546*, *580*, *586*, *Foster 758*); Deweyville (*Foster 1123*); Exchange Cove (*260*); Hidden Inlet (*73*); Ratz Harbor (*297*, *312*); Shipley Bay (*Foster 788*). Previously reported by the writer (**3**, p. 312; **4**, p. 132).

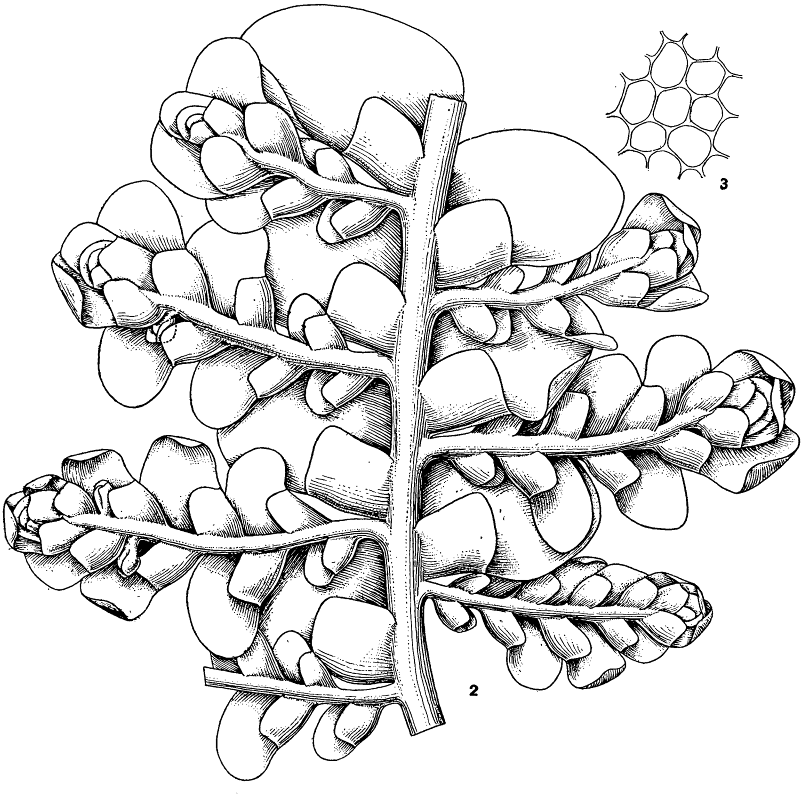
Whether the *Radula arctica* of Stephani (**14**, p. 98, *pl. 3*, *f. 11*) is to be considered a synonym of *R. Bolanderi* is still a matter of some doubt. *R. arctica* was based on sterile material collected by the Krause brothers at Chlowak and Chilcoot (No. 17). On the basis of Stephani's original description and figure Howe (**7**, p. 159, footnote) suggests that it probably represents a juvenile condition of *R. Bolanderi*. Stephani, however, does not accept this suggestion and still maintains that *R. arctica* is a valid species

(3, vol. 4, p. 220, 1910). He states that the material of *R. arctica* is not juvenile, that it shows well-developed and richly branched plants, that the stem- and branch-leaves are well preserved, that the leaves and the cell structure are very different from those of *R. Bolanderi*, and that it would be quite out of the question to consider the two species identical. A comparison of Stephani's figure of *R. arctica* with Pearson's figure of *R. Bolanderi* (**12**, *pl. 4*, as *R. spicata*) shows that Howe's suggestion is certainly well supported, and a study of Stephani's latest description of *R. arctica* does not bring out any differences which are at all convincing. At the same time the question cannot be regarded as definitely settled until the type specimen of *R. arctica* has been re-examined.

64. **Radula polyclada** sp. nov.

On rocks. Aats Bay (*900* mostly). The accompanying species are *Metzgeria conjugata* and *Frullania nisquallensis*.

Yellowish green, becoming brownish with age, not glossy, growing in loose tufts: stems mostly 2–3 cm. in length and 0.2 mm. in diameter, copiously and regularly pinnate, a branch usually arising behind each stem leaf, the branches widely spreading, 0.12 mm. in diameter, with smaller leaves than the stem, usually limited in growth after reaching a length of 0.5 cm. or less, often simple but sometimes bearing a few scattered and very short branches, 0.5 mm. long and 0.06 mm. in diameter, with still smaller leaves; rhizoids none: stem leaves contiguous to loosely imbricated, the lobe convex and sometimes revolute at the apex, spreading at an angle of about 80 degrees, slightly falcate, broadly ovate, about 1 mm. long and 0.85 mm. wide, attached by an almost longitudinal line, antical margin slightly or not at all dilated at the base, straight or somewhat rounded and arching partially across the axis, very rarely slightly beyond it, strongly outwardly curved to the broad and rounded apex, postical margin somewhat outwardly curved, forming a slight indentation at junction, with the slightly arched and scarcely decurrent keel; lobule subrhombiform in outline, about 0.55 mm. long and 0.4 mm. wide, more or less inflated along keel and in basal portion, otherwise appressed to the lobe, inner margin attached for almost its entire length by a nearly longitudinal line, not dilated, free margin parallel with keel and forming an angle of about 80 degrees with the inner margin, outer margin subparallel with the inner margin, apex rounded; leaf-cells plane, averaging 11 μ along the antical margin, 16 μ in the middle, and 22 μ at the base, the walls thin but with small trigones having concave sides, cuticle smooth: leaves of primary branches more or less imbricated, the lobe convex, more obliquely spreading than in the stem-leaves, ovate, about 0.45×0.35 mm.; the lobule trapezoidal in outline, the free margin being shorter than the keel, about 0.3×0.2 mm.: leaves of secondary branches still more obliquely spreading, subequally bilobed, the lobes about 0.18×0.1 mm.: inflorescence unknown. (TEXT FIGS. 2, 3.)



FIGS. 2, 3. *Radula polyclada* Evans. FIG. 2. Part of a stem showing seven branches, postical view, × 25. FIG. 3. Cells from the middle of a lobe, × 330. The figures were both drawn from the type specimen.

The numerous branches with their limited growth give the shoots of *R. polyclada* a distinctly plumose appearance, so that they bear a certain resemblance to the secondary shoots found in *Porella* and in the tropical genus *Bryopteris*. They look in fact as if they also might be secondary shoots arising from a prostrate caudex, and the absence of rhizoids adds to the plausibility of this idea. Unfortunately no signs of such a caudex can be demonstrated in the present material. Neither can the position which the shoots occupy in nature be made out, although they are probably pendulous or ascending.

Among Alaskan species *R. Bolanderi* is apparently the closest ally of *R. polyclada*. It is, however, a somewhat smaller plant, the stems being only 1–2 cm. in length and 0.12 mm. in diameter, while the maximum size of the stem-leaves is about 0.85×0.65 mm. It differs further in its less regular habit; in its more obliquely spreading stem-leaves, the angle formed with the stem being about 60 degrees; in the presence of rhizoids on its lobules; and in the apices of the lobules of its stem-leaves, which are obtuse or subacute instead of being rounded. The leaf-cells are much the same in the two species, both in size and in the characteristics of the cell-walls.

A still closer ally is the recently described *R. prolifera* Arnell,* known only from the type specimen, which was collected in 1898 by H. Nilsson-Ehle at Bulkur, in the valley of the Lena, Siberia. Through the kindness of Dr. Arnell the writer has been enabled to compare a portion of this type specimen with the material of *R. polyclada* and finds that, in spite of their close relationship, the two species cannot be considered synonymous.

In *R. prolifera* the branching is usually just as copious as in *R. polyclada*, and there seems to be an equal lack of rhizoids; the branches, however, are of a somewhat different character. A very small number are essentially like the main stem, their leaves resembling the stem-leaves in all essential respects; but the vast majority are more nearly comparable with the small-leaved secondary branches of *R. polyclada*, except that they are shorter and more often subdivided. They represent the "flagella" of Arnell's description and possibly act as propagula in multiplying the species vegetatively. The stem-leaves of *R. prolifera* differ from those of *R. polyclada* in having a less arched or even straight keel, a scarcely evident indentation at the end of the keel, a more sharply pointed and differently shaped lobule (the outer margin being only about half as long as the inner margin), and sometimes a greater dilation at the antical base of the lobe so that the margin arches beyond the stem. The leaves of the flagella are distant and subequally bilobed. So far as measurements go the two species are much the same, the lobes of the stem-leaves in *R. prolifera* measuring about 1×0.85 mm., the lobules about 0.5×0.4 mm., and the lobes of the flagella about 0.2×0.15 mm. In the stem-leaves the cells of the lobes average about 12 μ in diameter along the antical margin, about 18 μ in the middle, and about 20 μ at the base, so that these, too, agree closely with the cell-measurements in *R. polyclada;* and an equally close agreement may be found between the characters derived from the cell-walls.

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* Ark. för Botanik 13^2: 12. *pl. 1, f. 1, 2.* 1913

65. PLEUROZIA PURPUREA (Lightf.) Lindb.

Jungermannia purpurea Lightf. Fl. Scotica 778. 1777.
Jungermannia cochleariformis Hook. Brit. Jung. *pl. 68.* 1814.
Radula cochleariformis Dumort. Syll. Jung. 38. 1831.
Pleurozia cochleariformis Dumort. Recueil d'Obs. sur les Jung. 15. 1835.
Physiotium cochleariforme Nees, Naturg. Europ. Leberm. **3**: 79. 1838.
Pleurozia purpurea Lindb. Musc. Scand. 3. 1879.

In very wet places, Brownson Bay (*482*); Metlakatla (*111*); Nichols Bay (*376*). New to America. The species was originally described from specimens collected in Scotland, where it is now known to be widely distributed. It is known also from Ireland, the Faroe Islands, and Norway, and reappears in the Himalyas and in the Hawaiian Islands. Its geographical distribution, therefore, coincides in most respects with that of *Anastrepta orcadensis*, except that its range in Europe is more circumscribed.

The genus *Pleurozia* is one of the most clearly defined genera of the Hepaticae and includes ten species, all of which were known to Jack when he monographed the genus in 1886.* With the exception of *P. purpurea* the species are confined to tropical regions, four being cited by Jack from the Hawaiian Islands. The plants are all of large size, the stems in some of the species attaining a length of 12 cm., and all are characterized by a more or less marked purple pigmentation. One of the most remarkable features of the genus is found in the apical cell, which has only two cutting faces instead of three, as in all the other genera of the leafy hepatics. This interesting peculiarity was first pointed out by Goebel,* who naturally associated with it the total lack of underleaves. Even more interesting features, however, are found in the leaves. These, except in a single species, are bilobed and complicate, the postical lobe forming a highly complex water-sac, the mouth of which is closed by a complicated valve. The details of this singular structure are fully described by Goebel, in the place just quoted, so that it is unnecessary to include an account of them here.

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* Monographie der Lebermoosgattung *Physiotium*. Hedwigia **25**: 49–87. *pl. 1–10.* 1886.

The only species with which *P. purpurea* need be especially compared are *P. gigantea* (Web.) Lindb.† and *P. conchaefolia* (Hook. & Wils.) Aust.‡ both of which occur in the Hawaiian Islands, although not confined to them. In all three species the entire postical lobe takes part in the formation of the water-sac. In *P. purpurea,* however, the antical lobe is shortly bilobed at the apex with triangular spinose-dentate lobes, while in *P. gigantea* the antical lobe is usually quite undivided and much less sharply toothed. In *P. conchaefolia* the postical lobe is relatively much larger than in *P. purpurea,* instead of being about half as long, while the antical lobe is truncate or only slightly emarginate and otherwise entire in the apical portion. A full description of *P. purpurea,* with figures, is given by Macvicar,§ and an account of a well-developed perianth with its bracts has recently been published by Schiffner.||

66. PORELLA NAVICULARIS (Lehm. & Lindenb.) Lindb.

On trees. Brownson Bay (*479*); Kanagunut Island (*41*); Port San Antonio (*Foster 1121*); Ratz Harbor (*296*); Shipley Bay (*768*); Tam Gas Harbor (*135*). Previously reported by Gottsche, Lindenberg, and Nees von Esenbeck (**5**, p. 297, as *Madotheca navicularis*), Stephani (**14**, p. 98, as *M. navicularis*), and the writer (**3**, p. 313).

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* Flora **77**: 453. 1893.

† Hep. Scand. Exs. No. 5. 1874 (=*Jungermannia gigantea* Web.).

‡ Bull. Torrey Club **5**: 17. 1874 (= *Jungermannia conchaefolia* Hook. & Wils.).

§ Student's Handb. British Hepat. 394. *f. 1–3.* 1912.

|| Oesterr. Bot. Zeitschr. **62**: 11. *f. 1–3.* 1912.

67. PORELLA RIVULARIS (Nees) Trevis.

On rocks. Seward (*Rigg 1215, 1229*); Shipley Bay (*765*). Previously reported by Howe (**6**, p. 523; **7**, p. 60) and the writer (**3**, p. 312).

68. PORELLA ROELLII Steph.

On trees and logs. Hidden Inlet (*65, 76*). New to Alaska.

69. FRULLANIA FRANCISCANA M. A. Howe

On branches of bushes. Port San Antonio (*614*). Previously reported by the writer (**3**, p. 313).

70. FRULLANIA NISQUALLENSIS Sulliv.

On trees, bushes, and rocks. Aats Bay (*900* in part); Augustine Bay (*583*); Brownson Bay (*471*); Exchange Cove (*277*); Hidden Inlet (*78, 84*); Kanagunut Island (*51*); Metlakatla (*102*); Morse Cove (*455*); Nichols Bay (*374*); Port Alice (*Foster 731*); Port Malmsbury (*989* in part); Ratz Harbor (*294*); Shipley Bay (*772, 776, Foster 780*); Tam Gas Harbor (*115, 127, 132*). Previously reported by Stephani (**14**, p. 98), Coville (**2**), and the writer (**3**, p. 312).

ADDITIONAL HEPATICAE KNOWN FROM ALASKA

As in the preceding list the numbers in parentheses refer to the Bibliography on page 578, and the species are arranged according to Schiffner.

MARCHANTIACEAE. 1. *Sauteria alpina* (Nees & Bisch.) Nees (Howe, **7**, p. 39). 2. *Grimaldia fragrans* (Balb.) Corda (Evans, **3**, p. 290).

METZGERIACEAE. 3. *Riccardia major* Lindb. (Evans, **4**, p. 129, as *Aneura major*). 4. *Metzgeria hamata* Lindb. (Miss Cooley, **1**, p. 247). 5. *Pellia epiphylla* (L.) Corda (Miss Cooley, **1**, p. 247). 6. *P. Fabroniana* Raddi (Evans, **3**, p. 293, as *P. endiviaefolia*). 7. *Blasia pusilla* L. (Evans, **3**, p. 293).

JUNGERMANNIACEAE. 8. *Gymnomitrium concinnatum* (Lightf.) Corda (Stephani, **14**, p. 96). 9. *G. corallioides* Nees (Stephani, **14**, p. 96; Merriam, **9**; Howe, **7**, p. 102). 10. *G. crenulatum* Gottsche (Stephani, **15**, vol. 1, p. 143, as *Acolea crenulata*). 11. *Marsupella sphacelata* (Gieseke) Dumort. (Stephani, **14**, p. 96, as

Sarcoscyphus sphacelatus). 12. *Nardia compressa* (Hook.) S. F. Gray (Evans, **3**, p. 290). 13. *N. Geoscyphus* (DeNot.) Lindb. (Evans, as *N. haematosticta*, **3**, p. 296; **4**, p. 130). 14. *N. obovata* (Nees) Carringt. (Evans, **3**, p. 297). 15. *Jungermannia caespiticia* Lindenb. (Evans, **4**, p. 130). 16. *J. lanceolata* L. (Evans, **3**, p. 299). 17. *J. sphaerocarpa* Hook. (Evans, **3**, p. 298). 18. *Anastrophyllum Reichardtii* (Gottsche) Steph. (Evans, **3**, p. 299; *pl. 16, f. 4–17*). 19. *Lophozia attenuata* (Lindenb.) Dumort. (Evans, **3**, p. 304; **4**, p. 131). 20. *L. guttulata* (Lindb. & Arnell) Evans (Evans, **3**, p. 302). 21. *L. heterocolpa* (Thed.) M. A. Howe (Evans, **3**, p. 304). 22. *L. lycopodioides* (Wallr.) Cogn. (Howe, **8**, p. 103). 23. *L. obtusa* (Lindb.) Evans (Evans, **3**, p. 303). 24. *L. quadriloba* (Lindb.) Evans (Evans, **3**, p. 304). 25. *L. ventricosa* (Dicks.) Dumort. (Stephani, **14**, p. 97, as *Jungermannia ventricosa;* Evans, **3**, p. 301). 26. *Sphenolobus saxicola* (Schrad.) Steph. (Stephani, **14**, p. 97, as *Jungermannia saxicola*). 27. *Temnoma setiforme* (Ehrh.) M. A. Howe (Stephani, **14**, p. 97, as *Jungermannia setiformis;* Evans, **3**, p. 308, as *Blepharostoma setiforme*). 28. *Anthelia Juratzkana* (Limpr.) Trevis. (Evans, **3**, p. 309). 29. *Diplophyllum argenteum* (Tayl.) Spruce (Underwood, **16**, p. 366). 30. *D. imbricatum* (M. A. Howe) Steph. (Howe, **8**, p. 104, *pl. 14*, as *Scapania imbricata*). 31. *Scapania curta* (Mart.) Dumort. (Evans, **3**, p. 312; **4**, p. 132). 32. *Radula arctica* Steph. (Stephani, **14**, p. 98, *pl. 3, f. 11*). 33. *R. complanata* (L.) Dumort. (Stephani, **14**, p. 97, *pl. 3, f. 10*, as *R. Krausei;* Coville, **2**, as *R. Krausei;* Evans, **3**, p. 312; **4**, p. 132). 34. *Porella platyphylla* (L.) Lindb. (Gottsche, Lindenberg, and Nees von Esenbeck, **5**, p. 279, as *Madotheca platyphylla;* Stephani, **14**, p. 98, as *M. platyphylla;* Miss Cooley, **1**, p. 247). 35. *Frullania chilcootiensis* Steph. (Stephani, **14**, p. 98).

The following species have likewise been reported from Alaska but on insufficient evidence:

1. *Asterella fragrans* (Schleich.) Trevis. (Howe, **7**, p. 39). The record was based on a specimen collected at Telegraph Creek, British Columbia (close to the Alaska boundary), by G. M. Dawson. The species is surely to be expected in Alaska.

2. *A. tenella* (L.) Beauv. (Rothrock, **13**, as *Fimbriaria tenella*). A species of eastern North America. Rothrock's specimens, as

already noted by the writer (3, p. 288), have disappeared, so that it is impossible to determine upon which species his record was based.

3. *Chiloscyphus polyanthus* (L.) Corda (Evans, 3, p. 306). The report was based on very fragmentary specimens which, in view of the recent critical work done on the genus *Chiloscyphus*, are hardly in a condition to be determined.

4. *Lepidozia setacea* (Web.) Mitt. (Evans, 3, p. 308). The specimens listed belong to the subgenus *Microlepidozia* but are unfortunately sterile; their reference to a definite species is therefore uncertain.

4. *Frullania Tamarisci* (L.) Dumort. (Gottsche, Lindenberg, and Nees von Esenbeck, 5, p. 439). This species has not been collected recently in the Pacific Coast region. The specimens recorded in the Synopsis Hepaticarum are referred to the variety *laxa*, and possibly belong to *F. nisquallensis*. Unfortunately they have not been accessible to the writer.

DISCUSSION OF THE HEPATIC FLORA OF ALASKA

The general features of the hepatic flora of Alaska have already been pointed out by the writer (3, p. 289). In the northern part of the territory the flora is essentially like that of other northern regions; in the southern and southeastern parts the northern species become mingled with species characteristic of the Pacific Coast region of North America. The predominance of northern elements is apparent from the fact that sixty-nine of the species known from Alaska occur also in northern Europe and Asia, eighteen occur in northern Europe but have not yet been reported from Asia, while one, *Diplophyllum plicatum*, occurs in northern Asia but is unknown in Europe. Of the remaining eighteen species seventeen are Pacific Coast species and one, *Lepidozia sandvicensis*, occurs also in the Hawaiian Islands.

The seventy-one species common to both Europe and Asia are circumpolar in their distribution with the exception of *Metzgeria hamata*, *Anastrepta orcadensis*, and *Pleurozia purpurea*. These three species, although found in northern Europe, are limited in Asia to tropical regions, so far as known at the present time. Although it is hardly advisable to give a complete list of the circumpolar species, a list of the species which are known from Europe but not from Asia follows. It is needless to state that this list will probably be diminished when the hepatic flora of Asia is more fully known.

Riccardia major
Pallavicinia Flotowiana
Gymnomitrium crenulatum
G. obtusum
Nardia compressa
N. Geoscyphus
N. obovata
Jungermannia caespiticia
Anastrophyllum Reichardtii
Lophozia obtusa
Lophocolea cuspidata
Cephalozia leucantha
Bazzania Pearsoni
Herberta adunca
Diplophyllum ovatum
Scapania nemorosa
S. uliginosa
S. umbrosa

Of the European species occurring in Alaska the following belong to the so-called Atlantic species, being restricted in Europe to the neighborhood of the Atlantic coast:

Metzgeria hamata
Gymnomitrium crenulatum
Bazzania Pearsoni
Herberta adunca
Pleurozia purpurea

The characteristic Pacific coast species occurring in Alaska are listed below. All are endemic to North America and several are known only from Alaska.

Gyrothyra Underwoodiana
Plagiochila alaskana
P. Fryei
Lepidozia filamentosa
Ptilidium californicum
Diplophyllum argenteum
D. imbricatum
Scapania Bolanderi
S. cordifolia
Radula arctica
R. Bolanderi
R. polyclada
Porella navicularis
P. Roellii
Frullania chilcootiensis
F. franciscana
F. nisquallensis

A most surprising feature of the hepatic flora of Alaska is the group of species which are found also in the Hawaiian Islands. Some of these have already been mentioned on the preceding pages, but a complete list, as follows, may be of interest:

Marchantia polymorpha
Riccardia multifida
Anastrepta orcadensis
Lepidozia sandvicensis
Diplophyllum albicans
Pleurozia purpurea

The occurrence of Atlantic species and of Hawaiian species in Alaska is of much interest, although it is impossible to point out at the present time what its significance may be. Such a species as *Pleurozia purpurea*, which is evidently a stable species of great age, may originally have been much more abundant and more evenly distributed than at the present time. Then, through the encroachment of other species at various portions of its range, it may have become restricted to the isolated regions where it is now found. This might explain the occurrence of the species in both western Europe and Alaska and its absence from the intervening regions. There is little evidence, however, that the volcanic Hawaiian Islands were ever connected with either North America or with the mainland of Asia, so that it is difficult to account for any close connection between the plants of the Islands and those of Alaska or the Himalyas.

The most remarkable species in the present collection came from southeastern Alaska, and it is probable that many other Hepaticae remain to be discovered in this interesting region. Such a species as *Scapania planifolia* (Hook.) Dumort., for example, which often grows in company with *Pleurozia purpurea* in western Europe ought surely to be expected, especially since it occurs also in the Himalyas and in the Hawaiian Islands. And, in view of the presence of the very rare *Bazzania Pearsoni* in Alaska, other Atlantic species of circumscribed range may come to light. In any case southeastern Alaska is recommended to collectors as an unusually favorable region for careful study.

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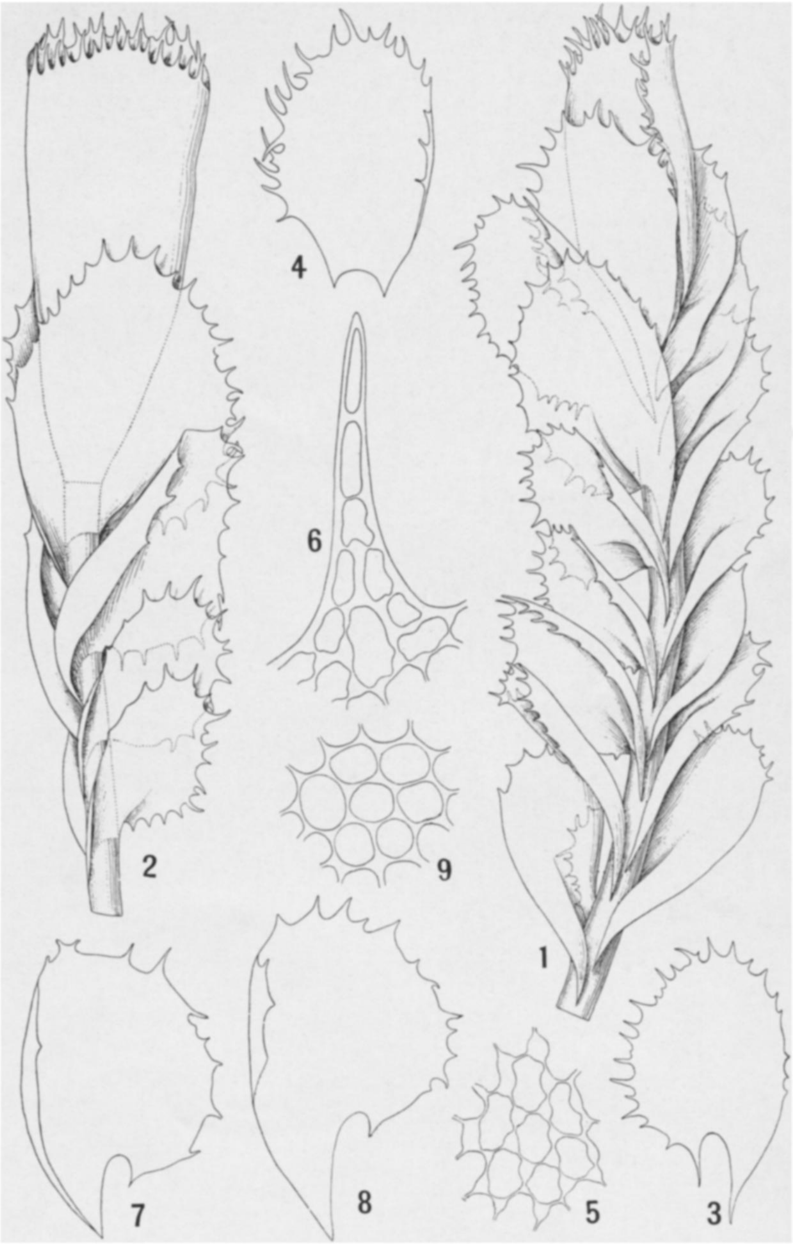
Explanation of plate 21

Plagiochila alaskana Evans. 1. Part of a stem with perianth, antical view, ×23. 2. Part of a stem with perianth, lateral view, ×23. 3. Leaf spread out, ×23. 4. Bract spread out, ×23. 5. Cells from the middle of a leaf, ×300. 6. Marginal tooth of a leaf, ×300. The figures were all drawn from the type specimen.

Plagiochila Fryei Evans. 7, 8. Leaves spread out, ×23. 9. Cells from the middle of a leaf, ×300. The figures were all drawn from the type specimen.



1–6. PLAGIOCHILA ALASKANA Evans
7–9. PLAGIOCHILA FRYEI Evans